

WHAT IS CLAIMED IS:

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1. An image-reading device comprising:

a photoelectric converting element reading a  
first image from a subject copy;

10 a reference-white member functioning as a  
reference white used in a white-shading correction;

reading means for reading a second image from  
a constant range on a surface of said reference-white  
member by using said photoelectric converting element;

15 averaging means for dividing image data of  
said second image into a plurality of blocks in a sub-  
scanning direction so that each of the blocks includes a  
plurality of lines, and obtaining average values of  
image data of said lines in said blocks respectively;

20 peak-value determining means for obtaining a  
peak value of said average values; and

white-shading correcting means for performing  
the white-shading correction to image data of said first  
image by using said peak value as white-shading data.

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2. An image-reading device comprising:

a photoelectric converting element reading a first image from a subject copy;

5 a scanning optical system scanning said subject copy by exposing said subject copy to light so as to form said first image on said photoelectric converting element;

a reference-white plate functioning as a reference white used in a white-shading correction;

10 reading means for reading a second image from a constant range on a surface of said reference-white plate by using said photoelectric converting element;

averaging means for dividing image data of said second image into a plurality of blocks in a sub-scanning direction so that each of the blocks includes a plurality of lines, and obtaining average values of image data of said lines in said blocks respectively;

15 peak-value determining means for obtaining a peak value of said average values; and

20 white-shading correcting means for performing the white-shading correction to image data of said first image by using said peak value as white-shading data.

3. An image-reading device comprising:

a subject-copy-conveying path conveying a subject copy;

a photoelectric converting element placed on  
5 said subject-copy-conveying path so as to read a first image from a surface of said subject copy;

a read roller placed opposite said  
photoelectric converting element with said subject-copy-  
conveying path therebetween so as to keep a distance  
10 constant between said surface of said subject copy and said photoelectric converting element by revolving, a surface of the read roller functioning as a reference white used in a white-shading correction;

reading means for reading a second image from  
15 a constant range on said surface of said read roller by using said photoelectric converting element;

averaging means for dividing image data of  
said second image into a plurality of blocks in a sub-  
scanning direction so that each of the blocks includes a  
20 plurality of lines, and obtaining average values of image data of said lines in said blocks respectively;

peak-value determining means for obtaining a peak value of said average values; and

white-shading correcting means for performing  
25 the white-shading correction to image data of said first

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image by using said peak value as white-shading data.

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4. The image-reading device as claimed in claim 3, wherein said read roller has a reference-white read surface formed as a part of said surface thereof, the reference-white read surface having a center of curvature on a straight line crossing a central axis of said read roller orthogonally so that said reference-white read surface is formed as a curved surface located inside an outermost peripheral locus of said read roller.

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5. The image-reading device as claimed in claim 4, wherein said constant range is at least one round on said surface of said read roller, and a length of each of said blocks in the sub-scanning direction is smaller than a length of said reference-white read surface.

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6. The image-reading device as claimed in claim 3, wherein said constant range is at least one round on said surface of said read roller.

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7. The image-reading device as claimed in claim 3, wherein said constant range is a range  
10 exceeding one round on said surface of said read roller;  
and

a length of each of said blocks in the sub-scanning direction is so set that, when said constant range is divided into said blocks, a fractional block is  
15 created in each round of said constant range.

8. The image-reading device as claimed in claim 1, wherein said averaging means obtains average  
20 values of image data of at least every second line of said lines in said blocks respectively.

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9. The image-reading device as claimed in claim 1, wherein said averaging means obtains moving averages of image data of respective sets of lines in said second image, instead of obtaining the average values of the image data of said lines in said blocks respectively; and

said peak-value determining means obtains a peak value of said moving average values.

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10. The image-reading device as claimed in claim 9, wherein said averaging means obtains the moving averages by moving first lines of the respective sets from each other by one line.

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11. An image-forming device comprising:  
an image-reading device including:  
a photoelectric converting element reading a first image from a subject copy;

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a reference-white member functioning as a

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a scanning optical system scanning said

subject copy by exposing said subject copy to light so as to form said first image on said photoelectric converting element;

5 a reference-white plate functioning as a reference white used in a white-shading correction;

reading means for reading a second image from a constant range on a surface of said reference-white plate by using said photoelectric converting element;

10 averaging means for dividing image data of said second image into a plurality of blocks in a sub-scanning direction so that each of the blocks includes a plurality of lines, and obtaining average values of image data of said lines in said blocks respectively;

15 peak-value determining means for obtaining a peak value of said average values; and

white-shading correcting means for performing the white-shading correction to image data of said first image by using said peak value as white-shading data,

20 wherein an image is formed on a sheet according to the image data of said first image.

25 13. An image-forming device comprising:



an image-reading device including:

a subject-copy-conveying path conveying a  
subject copy;

a photoelectric converting element placed on  
5 said subject-copy-conveying path so as to read a first  
image from a surface of said subject copy;

a read roller placed opposite said  
photoelectric converting element with said subject-copy-  
conveying path therebetween so as to keep a distance  
10 constant between said surface of said subject copy and  
said photoelectric converting element by revolving, a  
surface of the read roller functioning as a reference  
white used in a white-shading correction;

reading means for reading a second image from  
15 a constant range on said surface of said read roller by  
using said photoelectric converting element;

averaging means for dividing image data of  
said second image into a plurality of blocks in a sub-  
scanning direction so that each of the blocks includes a  
20 plurality of lines, and obtaining average values of  
image data of said lines in said blocks respectively;

peak-value determining means for obtaining a  
peak value of said average values; and

white-shading correcting means for performing  
25 the white-shading correction to image data of said first

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image by using said peak value as white-shading data,  
wherein an image is formed on a sheet  
according to the image data of said first image.

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- 10 14. An image-reading device comprising:  
a photoelectric converting element reading a  
first image from a subject copy;  
a reference-white member functioning as a  
reference white used in a white-shading correction;  
an image-reading unit reading a second image  
from a constant range on a surface of said reference-  
15 white member by using said photoelectric converting  
element;  
an average-value circuit dividing image data  
of said second image into a plurality of blocks in a  
sub-scanning direction so that each of the blocks  
20 includes a plurality of lines, and obtaining average  
values of image data of said lines in said blocks  
respectively;  
a peak-value circuit obtaining a peak value of  
said average values; and  
25 a white-shading calculating circuit performing

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a scanning optical system scanning said subject copy by exposing said subject copy to light so as to form said first image on said photoelectric converting element;

an image-reading unit reading a second image from a constant range on a surface of said reference-white plate by using said photoelectric converting element;

20            an average-value circuit dividing image data  
of said second image into a plurality of blocks in a  
sub-scanning direction so that each of the blocks  
includes a plurality of lines, and obtaining average  
values of image data of said lines in said blocks  
25    respectively;

a peak-value circuit obtaining a peak value of said average values; and

a white-shading calculating circuit performing the white-shading correction to image data of said first  
5 image by using said peak value as white-shading data.

10 16. An image-reading device comprising:  
a subject-copy-conveying path conveying a subject copy;

a photoelectric converting element placed on said subject-copy-conveying path so as to read a first  
15 image from a surface of said subject copy;

a read roller placed opposite said photoelectric converting element with said subject-copy-conveying path therebetween so as to keep a distance constant between said surface of said subject copy and  
20 said photoelectric converting element by revolving, a surface of the read roller functioning as a reference white used in a white-shading correction;

an image-reading unit reading a second image from a constant range on said surface of said read  
25 roller by using said photoelectric converting element;

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an average-value circuit dividing image data  
of said second image into a plurality of blocks in a  
sub-scanning direction so that each of the blocks  
includes a plurality of lines, and obtaining average  
5 values of image data of said lines in said blocks  
respectively;

a peak-value circuit obtaining a peak value of  
said average values; and

a white-shading calculating circuit performing  
10 the white-shading correction to image data of said first  
image by using said peak value as white-shading data.

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17. The image-reading device as claimed in  
claim 16, wherein said read roller has a reference-white  
read surface formed as a part of said surface thereof,  
the reference-white read surface having a center of  
20 curvature on a straight line crossing a central axis of  
said read roller orthogonally so that said reference-  
white read surface is formed as a curved surface located  
inside an outermost peripheral locus of said read roller.

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18. The image-reading device as claimed in claim 17, wherein said constant range is at least one round on said surface of said read roller, and a length of each of said blocks in the sub-scanning direction is smaller than a length of said reference-white read surface.

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19. The image-reading device as claimed in claim 16, wherein said constant range is at least one round on said surface of said read roller.

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20. The image-reading device as claimed in claim 16, wherein said constant range is a range exceeding one round on said surface of said read roller; and

a length of each of said blocks in the sub-scanning direction is so set that, when said constant range is divided into said blocks, a fractional block is created in each round of said constant range.

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21. The image-reading device as claimed in claim 14, wherein said average-value circuit obtains average values of image data of at least every second line of said lines in said blocks respectively.

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22. The image-reading device as claimed in claim 14, wherein said average-value circuit obtains moving averages of image data of respective sets of lines in said second image, instead of obtaining the average values of the image data of said lines in said blocks respectively; and

15           said peak-value circuit obtains a peak value of said moving average values.

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23. The image-reading device as claimed in claim 22, wherein said average-value circuit obtains the moving averages by moving first lines of the respective sets from each other by one line.

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first image from a subject copy;

an image-reading unit reading a second image from a constant range on a surface of said reference-white member by using said photoelectric converting

an average-value circuit dividing image data of said second image into a plurality of blocks in a sub-scanning direction so that each of the blocks includes a plurality of lines, and obtaining average values of image data of said lines in said blocks respectively;

a white-shading calculating circuit performing the white-shading correction to image data of said first image by using said peak value as white-shading data,

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25. An image-forming device comprising:  
an image-reading device including:  
a photoelectric converting element reading a  
first image from a subject copy;
- 5 a scanning optical system scanning said  
subject copy by exposing said subject copy to light so  
as to form said first image on said photoelectric  
converting element;
- a reference-white plate functioning as a  
10 reference white used in a white-shading correction;  
an image-reading unit reading a second image  
from a constant range on a surface of said reference-  
white plate by using said photoelectric converting  
element;
- 15 an average-value circuit dividing image data  
of said second image into a plurality of blocks in a  
sub-scanning direction so that each of the blocks  
includes a plurality of lines, and obtaining average  
values of image data of said lines in said blocks  
20 respectively;
- a peak-value circuit obtaining a peak value of  
said average values; and
- a white-shading calculating circuit performing  
the white-shading correction to image data of said first  
25 image by using said peak value as white-shading data,

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wherein an image is formed on a sheet  
according to the image data of said first image.

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26. An image-forming device comprising:  
an image-reading device including:  
a subject-copy-conveying path conveying a  
10 subject copy;  
a photoelectric converting element placed on  
said subject-copy-conveying path so as to read a first  
image from a surface of said subject copy;  
a read roller placed opposite said  
15 photoelectric converting element with said subject-copy-  
conveying path therebetween so as to keep a distance  
constant between said surface of said subject copy and  
said photoelectric converting element by revolving, a  
surface of the read roller functioning as a reference  
20 white used in a white-shading correction;  
an image-reading unit reading a second image  
from a constant range on said surface of said read  
roller by using said photoelectric converting element;  
an average-value circuit dividing image data  
25 of said second image into a plurality of blocks in a

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sub-scanning direction so that each of the blocks includes a plurality of lines, and obtaining average values of image data of said lines in said blocks respectively;

5           a peak-value circuit obtaining a peak value of said average values; and

          a white-shading calculating circuit performing the white-shading correction to image data of said first image by using said peak value as white-shading data,

10           wherein an image is formed on a sheet according to the image data of said first image.

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27. A method of creating reference-white data comprising:

          the reading step of reading an image from a constant range on a surface of a reference-white member by using a photoelectric converting element, the  
20           reference-white member functioning as a reference white used in a white-shading correction;

          the averaging step of dividing image data of said image into a plurality of blocks in a sub-scanning  
25           direction so that each of the blocks includes a

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plurality of lines, and obtaining average values of  
image data of said lines in said blocks respectively;  
and

the peak-value determining step of obtaining a  
5 peak value of said average values so as to create white-  
shading data.

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28. The method as claimed in claim 27,  
wherein said reading step reads an image from a constant  
range on a surface of a revolving read roller as said  
reference-white member, the revolving read roller being  
15 placed opposite said photoelectric converting element,  
and said constant range is at least one round on said  
surface of said revolving read roller.

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29. The method as claimed in claim 27,  
wherein said reading step reads an image from a constant  
range on a surface of a revolving read roller as said  
25 reference-white member, the revolving read roller being

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placed opposite said photoelectric converting element,  
and the constant range being a range exceeding one round  
on said surface of said revolving read roller; and

5       said averaging step sets a length of each of  
said blocks in the sub-scanning direction so that, when  
said constant range is divided into said blocks, a  
fractional block is created in each round of said  
constant range.

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30. The method as claimed in claim 27,  
wherein said reading step reads an image from a constant  
15   range on a surface of a revolving read roller as said  
reference-white member, the revolving read roller being  
placed opposite said photoelectric converting element  
and having a reference-white read surface formed as a  
part of said surface thereof, the reference-white read  
20   surface having a center of curvature on a straight line  
crossing a central axis of said revolving read roller  
orthogonally so that said reference-white read surface  
is formed as a curved surface located inside an  
outermost peripheral locus of said revolving read roller,  
25   and the constant range being at least one round on said

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surface of said revolving read roller; and

said averaging step sets a length of each of said blocks in the sub-scanning direction smaller than a length of said reference-white read surface.

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31. The method as claimed in claim 27,

10 wherein said averaging step obtains average values of  
image data of at least every second line of said lines  
in said blocks respectively.

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32. The method as claimed in claim 27,

wherein said averaging step obtains moving averages of image data of respective sets of lines in said image, instead of obtaining the average values of the image data of said lines in said blocks respectively; and

said peak-value determining step obtains a peak value of said moving average values.

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33. The method as claimed in claim 32,  
wherein said averaging step obtains the moving averages  
by moving first lines of the respective sets from each  
other by one line.

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